

## Project Assumptions

Sources of estimates to calculate WEGHG savings for SWES Proposal

### Fresno Project

1. Enter the baseline (pre-project) volume of water associated with the project: **12,155 MG/year**

- 110,000 eligible houses in the Fresno Service Area (WaterSmart 2014a)
- 37.5%\* deployment of WaterSmart across eligible households
- WaterSmart deployed to 38,500 households (110,000 x .35).
- Fresno is in the Tulare Lake hydrologic zone where household water use averages 272 gallons per capita per day (DWR CA Water Plan Update 2013, Figure 3-30).
- The City of Fresno is in Fresno county, which has an average of 3.18 people per household (US Census Quick Facts, <http://quickfacts.census.gov/qfd/states/06/06019.html>)
- Baseline water use is estimated as 38,500 HH x 3.18 ppl/HH x 272 g/p/d x 365 day/yr / 1000000G/MG = **12,155 MG/year**

*\*We intend that our deployment of WaterSmart via the DWR Water-Energy Grant will be matched by the local water utility, so that total deployment will be 70% of households (leaving 30% of households as a control group to test the efficacy of the program).*

2. Enter the volume of water that will be delivered after the project is implemented: **11,547 MG/year**

- Estimated that WaterSmart Software will save 5% of total water consumption in households where the technology is deployed (Mitchel and Chestnutt, 2013).
- So, 95% of baseline is  $12,155 \times .95 = \mathbf{11,547 \text{ MG/year}}$

3. Enter the volume of hot water saved from the project's electric water heating system: **11 MG/year**

- Total water saved from WaterSmart =  $12,155 - 11,547 = \mathbf{608 \text{ MG/yr}}$
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 10% of hot water heaters in California are electric (CEC 2009)
- Electric hot water savings is estimated as  $608 \text{ MG/yr} \times .47 \times .40 \times .10 = 11 \text{ MG/yr}$

4. Enter the volume of hot water saved from the project's natural gas water heating system: **103 MG/year**

- Total water saved from WaterSmart =  $12,155 - 11,547 = \mathbf{608 \text{ MG/yr}}$
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 90% of hot water heaters in California are gas-fired (CEC 2009)
- Electric hot water savings is estimated as  $608 \text{ MG/yr} \times .47 \times .40 \times .90 = 103 \text{ MG/yr}$

5. Enter the useful life in years for the project: **3 years**

- We aim to deploy WaterSmart conservation messaging (mailers and customer web access) for the life of the project (3 years) to observe the short- and longer term impacts of the technology.

6. Enter the percentage of water that is imported: **0%**

- Fresno does not import water from the State Water Project or the Delta Mendota Canal, but rather relies on local groundwater and regionally available surface water.

7. Enter the Energy Intensity (EI) of the System associated with the project's water savings: **2,258 kWh/MG**

- 53% of conservation is outdoor water (DeOreo 2011)
- Average CA outdoor water energy intensity is 1,312 kWh/MG
  - 312 kWh/MG for treatment + 1000 kWh/MG for distribution (CPUC Study 2, 2010)
- 47% of conservation is indoor water (DeOreo 2011)
- Average CA indoor water energy intensity is 3,324 kWh/MG
  - 1312 kWh/MG for water supply + 2012 kWh/MG for wastewater (CPUC Study 2, 2010)
- Weighted average energy intensity =  $(1312 \cdot .53) + (3324 \cdot .47) = \mathbf{2,258 \text{ kWh/MG}}$

8. Enter the total output emission rate specific to the power supplier or use the default value of **0.278 kg CO<sub>2</sub>e/kWh**

- Used default value.

9. Enter EI associated with the Supply and Conveyance segment of the imported water or enter "0" if imported water is not applicable: **0**

- Not applicable.

10. Enter any additional annual energy savings from energy efficiency and renewable energy, etc.: **0**

- Not applicable.

## Fresno References

DeOreo, W.B., and P.W. Mayer (2000), "The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis", Aquacraft, Inc. Report.

DeOreo, W.B., and P.W. Mayer (2011), "California Single Family Water Use Efficiency Study", Aquacraft, Inc. Report.

CEC (2009). "2008 Building Energy Efficiency Standards: Residential Compliance Manual" California Energy Commission (CEC). CEC-400-Program website: Energy and Cost Savings Calculators.

Mitchell, D, and T, Chestnutt. (2013) *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports*. M Cubed Consulting. Funded by California Water Foundation.

WaterSmart (2014a) WaterSmart Software direct communication with City of Fresno.

## Modesto Project

1. Enter the baseline (pre-project) volume of water associated with the project: **3,281 MG/year**

- 35,000 eligible houses in the Modesto Service Area (WaterSmart 2014a)
- 35%\* deployment of WaterSmart across eligible households
- WaterSmart deployed to 12,250 households (35,000 x .35).
- Modesto is in the San Joaquin hydrologic zone where household water use averages 239 gallons per capita per day (DWR CA Water Plan Update 2013, Figure 3-30).
- The City of Modesto is in Stanislaus county, which has an average of 3.07 people per household (US Census Quick Facts, <http://quickfacts.census.gov/qfd/states/06/06099.html>)
- Baseline water use is estimated as 12,250 HH x 3.07 ppl/HH x 239 g/p/d x 365 day/yr / 1000000G/MG = **3,281 MG/year**

*\*We intend that our deployment of WaterSmart via the DWR Water-Energy Grant will be matched by the local water utility, so that total deployment will be 70% of households (leaving 30% of households as a control group to test the efficacy of the program).*

2. Enter the volume of water that will be delivered after the project is implemented: **3,117 MG/year**

- Estimated that WaterSmart Software will save 5% of total water consumption in households where the technology is deployed (Mitchel and Chestnutt, 2013).
- So, 95% of baseline is  $3,281 \times .95 =$  **3,117 MG/year**

3. Enter the volume of hot water saved from the project's electric water heating system: **3 MG/year**

- Total water saved from WaterSmart =  $3,281 - 3,117 =$  **164 MG/yr**
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 10% of hot water heaters in California are electric (CEC 2009)
- Electric hot water savings is estimated as  $164 \text{ MG/yr} \times .47 \times .40 \times .10 =$  3 MG/yr

4. Enter the volume of hot water saved from the project's natural gas water heating system: **28 MG/year**

- Total water saved from WaterSmart =  $3,281 - 3,117 =$  **28 MG/yr**
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 90% of hot water heaters in California are gas-fired (CEC 2009)
- Electric hot water savings is estimated as  $164 \text{ MG/yr} \times .47 \times .40 \times .90 =$  28 MG/yr

5. Enter the useful life in years for the project: **3 years**

- We aim to deploy WaterSmart conservation messaging (mailers and customer web access) for the life of the project (3 years) to observe the short- and longer term impacts of the technology.

6. Enter the percentage of water that is imported: **0%**

- Modesto does not import water from the State Water Project or the Delta Mendota Canal, but rather relies on regionally available surface water and groundwater.

7. Enter the Energy Intensity (EI) of the System associated with the project's water savings: **2,258 kWh/MG**

- 53% of conservation is outdoor water (DeOreo 2011)
- Average CA outdoor water energy intensity is 1,312 kWh/MG
  - 312 kWh/MG for treatment + 1000 kWh/MG for distribution (CPUC Study 2, 2010)
- 47% of conservation is indoor water (DeOreo 2011)
- Average CA indoor water energy intensity is 3,324 kWh/MG
  - 1312 kWh/MG for water supply + 2012 kWh/MG for wastewater (CPUC Study 2, 2010)
- Weighted average energy intensity =  $(1312 \cdot .53) + (3324 \cdot .47) = \mathbf{2,258 \text{ kWh/MG}}$

8. Enter the total output emission rate specific to the power supplier or use the default value of **0.278 kg CO<sub>2</sub>e/kWh**

- Used default value.

9. Enter EI associated with the Supply and Conveyance segment of the imported water or enter "0" if imported water is not applicable: **0**

- Not applicable.

10. Enter any additional annual energy savings from energy efficiency and renewable energy, etc.: **0**

- Not applicable.

## Modesto References

DeOreo, W.B., and P.W. Mayer (2000), "The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis", Aquacraft, Inc. Report.

DeOreo, W.B., and P.W. Mayer (2011), "California Single Family Water Use Efficiency Study", Aquacraft, Inc. Report.

CEC (2009). "2008 Building Energy Efficiency Standards: Residential Compliance Manual" California Energy Commission (CEC). CEC-400-Program website: Energy and Cost Savings Calculators.

Mitchell, D, and T, Chestnutt. (2013) *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports*. M Cubed Consulting. Funded by California Water Foundation.

WaterSmart (2014a) WaterSmart Software direct communication with City of Modesto.

## Ontario Project

1. Enter the baseline (pre-project) volume of water associated with the project: **2,332 MG/year**

- 29,000 eligible houses in the Ontario Service Area (WaterSmart 2014b)
- 35%\* deployment of WaterSmart across eligible households
- WaterSmart deployed to 10,150 households (29,000 x .35).
- Ontario is in the South Coast hydrologic zone where household water use averages 189 gallons per capita per day (DWR CA Water Plan Update 2013, Figure 3-30).
- The City of Ontario is in San Bernadino county, which has an average of 3.33 people per household (US Census Quick Facts, <http://quickfacts.census.gov/qfd/states/06/06071.html>)
- Baseline water use is estimated as 10,150 hh x 3.33 ppl/hh x 189 g/p/d x 365 d/yr / 1000000G/MG = **2,332 MG/year**

*\*We intend that our deployment of WaterSmart via the DWR Water-Energy Grant will be matched by the local water utility, so that total deployment will be 70% of households (leaving 30% of households as a control group to test the efficacy of the program).*

2. Enter the volume of water that will be delivered after the project is implemented: **2,215 MG/year**

- Estimated that WaterSmart Software will save 5% of total water consumption in households where the technology is deployed (Mitchel and Chestnutt, 2013).
- So, 95% of baseline is  $2,332 \times .95 = \mathbf{2,215 \text{ MG/year}}$

3. Enter the volume of hot water saved from the project's electric water heating system: **2 MG/year**

- Total water saved from WaterSmart =  $2,332 - 2,215 = \mathbf{117 \text{ MG/yr}}$
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 10% of hot water heaters in California are electric (CEC 2009)
- Electric hot water savings is estimated as  $117 \text{ MG/yr} \times .47 \times .40 \times .10 = 2 \text{ MG/yr}$

4. Enter the volume of hot water saved from the project's natural gas water heating system: **20 MG/year**

- Total water saved from WaterSmart =  $2,332 - 2,215 = \mathbf{117 \text{ MG/yr}}$
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 90% of hot water heaters in California are gas-fired (CEC 2009)
- Electric hot water savings is estimated as  $117 \text{ MG/yr} \times .47 \times .40 \times .90 = 20 \text{ MG/yr}$

5. Enter the useful life in years for the project: **3 years**

- We aim to deploy WaterSmart conservation messaging (mailers and customer web access) for the life of the project (3 years) to observe the short- and longer term impacts of the technology.

6. Enter the percentage of water that is imported: **31%**

- 31% of Ontario's water is imported from the State Water Project (City of Ontario 2011).

7. Enter the Energy Intensity (EI) of the System associated with the project's water savings: **2,258 kWh/MG**

- 53% of conservation is outdoor water (DeOreo 2011)
- Average CA outdoor water energy intensity is 1,312 kWh/MG
  - 312 kWh/MG for treatment + 1000 kWh/MG for distribution (CPUC Study 2, 2010)
- 47% of conservation is indoor water (DeOreo 2011)
- Average CA indoor water energy intensity is 3,324 kWh/MG
  - 1312 kWh/MG for water supply + 2012 kWh/MG for wastewater (CPUC Study 2, 2010)
- Weighted average energy intensity =  $(1312 \cdot .53) + (3324 \cdot .47) = \mathbf{2,258 \text{ kWh/MG}}$

8. Enter the total output emission rate specific to the power supplier or use the default value of **0.278 kg CO<sub>2</sub>e/kWh**

- Used default value.

9. Enter EI associated with the Supply and Conveyance segment of the imported water or enter "0" if imported water is not applicable: **13,606 kWh/MG**

- The City of Ontario receives water from the State Water Project conveyance system after the water passes through the Pearblossom pumping plant. DWR provides this estimate of 13,606 kWh/MG at this location directly in the DWR Water-Energy Grant PSP.

10. Enter any additional annual energy savings from energy efficiency and renewable energy, etc.: **0**

- Not applicable.

## Ontario References

City of Ontario. (2011) *2010 Urban Water Management Plan*.

<http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Ontario,%20City%20of/2010%20Urban%20Water%20Management%20Plan%20-%20Report.pdf>

DeOreo, W.B., and P.W. Mayer (2000), "The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis", Aquacraft, Inc. Report.

DeOreo, W.B., and P.W. Mayer (2011), "California Single Family Water Use Efficiency Study", Aquacraft, Inc. Report.

CEC (2009). "2008 Building Energy Efficiency Standards: Residential Compliance Manual" California Energy Commission (CEC). CEC-400-Program website: Energy and Cost Savings Calculators.

Mitchell, D, and T, Chestnutt. (2013) *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports*. M Cubed Consulting. Funded by California Water Foundation. [http://californiawaterfoundation.org/uploads/1389391749-WaterSmart\\_evaluation\\_report\\_FINAL\\_12-12-13\(00238356\).pdf](http://californiawaterfoundation.org/uploads/1389391749-WaterSmart_evaluation_report_FINAL_12-12-13(00238356).pdf)

WaterSmart (2014a) WaterSmart Software direct communication with City of Ontario.

## Riverside Project

1. Enter the baseline (pre-project) volume of water associated with the project: **4,313 MG/year**

- 56,000 eligible houses in the Riverside Service Area (WaterSmart 2014c)
- 35%\* deployment of WaterSmart across eligible households
- WaterSmart deployed to 19,600 households (56,000 x .35).
- Riverside is in the South Coast hydrologic zone where household water use averages 189 gallons per capita per day (DWR CA Water Plan Update 2013, Figure 3-30).
- The City of Riverside is in Riverside county, which has an average of 3.19 people per household (US Census Quick Facts, <http://quickfacts.census.gov/qfd/states/06/06065.html>)
- Baseline water use is estimated as 19,600 HH x 3.19 ppl/HH x 189 g/p/d x 365 day/yr / 1000000G/MG = **4,313 MG/year**

*\*We intend that our deployment of WaterSmart via the DWR Water-Energy Grant will be matched by the local water utility, so that total deployment will be 70% of households (leaving 30% of households as a control group to test the efficacy of the program).*

2. Enter the volume of water that will be delivered after the project is implemented: **4,097 MG/year**

- Estimated that WaterSmart Software will save 5% of total water consumption in households where the technology is deployed (Mitchel and Chestnutt, 2013).
- So, 95% of baseline is 4,313 x .95 = **4,097 MG/year**

3. Enter the volume of hot water saved from the project's electric water heating system: **4 MG/year**

- Total water saved from WaterSmart = 4,313 – 4,097 = **216 MG/yr**
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 10% of hot water heaters in California are electric (CEC 2009)
- Electric hot water savings is estimated as 216 MG/yr x .47 x .40 x .10 = 4 MG/yr

4. Enter the volume of hot water saved from the project's natural gas water heating system: **37 MG/year**

- Total water saved from WaterSmart = 4,313 – 4,097 = **216 MG/yr**
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 90% of hot water heaters in California are gas-fired (CEC 2009)
- Electric hot water savings is estimated as 216 MG/yr x .47 x .40 x .90 = 37 MG/yr

5. Enter the useful life in years for the project: **3 years**

- We aim to deploy WaterSmart conservation messaging (mailers and customer web access) for the life of the project (3 years) to observe the short- and longer term impacts of the technology.

6. Enter the percentage of water that is imported: **17%**

- 17% of Riverside's water is imported from the State Water Project (City of Riverside 2011).



7. Enter the Energy Intensity (EI) of the System associated with the project's water savings: **2,258 kWh/MG**

- 53% of conservation is outdoor water (DeOreo 2011)
- Average CA outdoor water energy intensity is 1,312 kWh/MG
  - 312 kWh/MG for treatment + 1000 kWh/MG for distribution (CPUC Study 2, 2010)
- 47% of conservation is indoor water (DeOreo 2011)
- Average CA indoor water energy intensity is 3,324 kWh/MG
  - 1312 kWh/MG for water supply + 2012 kWh/MG for wastewater (CPUC Study 2, 2010)
- Weighted average energy intensity =  $(1312 \cdot .53) + (3324 \cdot .47) = \mathbf{2,258 \text{ kWh/MG}}$

8. Enter the total output emission rate specific to the power supplier or use the default value of **0.278 kg CO<sub>2</sub>e/kWh**

- Used default value.

9. Enter EI associated with the Supply and Conveyance segment of the imported water or enter "0" if imported water is not applicable: **13,606 kWh/MG**

- The City of Riverside receives water from the State Water Project conveyance system after the water passes through the Pearblossom pumping plant. DWR provides this estimate of 13,606 kWh/MG at this location directly in the DWR Water-Energy Grant PSP.

10. Enter any additional annual energy savings from energy efficiency and renewable energy, etc.: **0**

- Not applicable.

## Riverside References

City of Riverside. (2011) *2010 Urban Water Management Plan*.

<http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Riverside,%20City%20of/RPU's%20FINAL%202010%20UWMP%20-%20July%202011.pdf>

DeOreo, W.B., and P.W. Mayer (2000), "The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis", Aquacraft, Inc. Report.

DeOreo, W.B., and P.W. Mayer (2011), "California Single Family Water Use Efficiency Study", Aquacraft, Inc. Report.

CEC (2009). "2008 Building Energy Efficiency Standards: Residential Compliance Manual" California Energy Commission (CEC). CEC-400-Program website: Energy and Cost Savings Calculators.

Mitchell, D, and T, Chestnutt. (2013) *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports*. M Cubed Consulting. Funded by California Water Foundation.

WaterSmart (2014a) WaterSmart Software direct communication with City of Riverside.



## Turlock Project

1. Enter the baseline (pre-project) volume of water associated with the project: **1,629 MG/year**

- 17,382 eligible houses in the Turlock Service Area (WaterSmart 2014a)
- 35%\* deployment of WaterSmart across eligible households
- WaterSmart deployed to 6,084 households (17,382 x .35).
- Turlock is in the San Joaquin hydrologic zone where household water use averages 239 gallons per capita per day (DWR CA Water Plan Update 2013, Figure 3-30).
- The City of Turlock is in Stanislaus county, which has an average of 3.07 people per household (US Census Quick Facts, <http://quickfacts.census.gov/qfd/states/06/06099.html>)
- Baseline water use is estimated as 6,084 HH x 3.07 ppl/HH x 239 g/p/d x 365 day/yr / 1000000G/MG = **1,629 MG/year**

*\*We intend that our deployment of WaterSmart via the DWR Water-Energy Grant will be matched by the local water utility, so that total deployment will be 70% of households (leaving 30% of households as a control group to test the efficacy of the program).*

2. Enter the volume of water that will be delivered after the project is implemented: **1,548 MG/year**

- Estimated that WaterSmart Software will save 5% of total water consumption in households where the technology is deployed (Mitchel and Chestnutt, 2013).
- So, 95% of baseline is 1,629 x .95 = **1,548 MG/year**

3. Enter the volume of hot water saved from the project's electric water heating system: **2 MG/year**

- Total water saved from WaterSmart = 1,629 – 1,548 = **81 MG/yr**
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 10% of hot water heaters in California are electric (CEC 2009)
- Electric hot water savings is estimated as 81 MG/yr x .47 x .40 x .10 = 2 MG/yr

4. Enter the volume of hot water saved from the project's natural gas water heating system: **14 MG/year**

- Total water saved from WaterSmart = 1,629 – 1,548 = **81 MG/yr**
- 47% percentage of CA residential water use that is estimated as indoor use (DeOreo 2011)
- 40% of indoor water is hot water (DeOreo and Mayer 2010)
- 90% of hot water heaters in California are gas-fired (CEC 2009)
- Electric hot water savings is estimated as 81 MG/yr x .47 x .40 x .90 = 14 MG/yr

5. Enter the useful life in years for the project: **3 years**

- We aim to deploy WaterSmart conservation messaging (mailers and customer web access) for the life of the project (3 years) to observe the short- and longer term impacts of the technology.

6. Enter the percentage of water that is imported: **0%**

- Turlock does not import water from the State Water Project or the Delta Mendota Canal, but rather relies on regionally available surface water and groundwater.

7. Enter the Energy Intensity (EI) of the System associated with the project's water savings: **2,258 kWh/MG**

- 53% of conservation is outdoor water (DeOreo 2011)
- Average CA outdoor water energy intensity is 1,312 kWh/MG
  - 312 kWh/MG for treatment + 1000 kWh/MG for distribution (CPUC Study 2, 2010)
- 47% of conservation is indoor water (DeOreo 2011)
- Average CA indoor water energy intensity is 3,324 kWh/MG
  - 1312 kWh/MG for water supply + 2012 kWh/MG for wastewater (CPUC Study 2, 2010)
- Weighted average energy intensity =  $(1312 \cdot .53) + (3324 \cdot .47) = \mathbf{2,258 \text{ kWh/MG}}$

8. Enter the total output emission rate specific to the power supplier or use the default value of **0.278 kg CO<sub>2</sub>e/kWh**

- Used default value.

9. Enter EI associated with the Supply and Conveyance segment of the imported water or enter "0" if imported water is not applicable: **0**

- Not applicable.

10. Enter any additional annual energy savings from energy efficiency and renewable energy, etc.: **0**

- Not applicable.

## Turlock References

DeOreo, W.B., and P.W. Mayer (2000), "The End Uses of Hot Water in Single Family Homes from Flow Trace Analysis", Aquacraft, Inc. Report.

DeOreo, W.B., and P.W. Mayer (2011), "California Single Family Water Use Efficiency Study", Aquacraft, Inc. Report.

CEC (2009). "2008 Building Energy Efficiency Standards: Residential Compliance Manual" California Energy Commission (CEC). CEC-400-Program website: Energy and Cost Savings Calculators.

Mitchell, D, and T, Chestnutt. (2013) *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports*. M Cubed Consulting. Funded by California Water Foundation.

WaterSmart (2014a) WaterSmart Software direct communication with City of Turlock.